EFFECT OF FEAR AVOIDANCE TREATMENT FOR ACUTE/SUB-ACUTE LOW BACK PAIN PATIENTS IN PHYSICAL THERAPY CLINICS: A RANDOMIZED CLINICAL TRIAL

by

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ABSTRACT

Nonspecific low back pain (LBP) is defined as pain between the 12th rib and the inferior gluteal folds, with or without leg pain and present in the absence of any specific pathology. Approximately 80 percent of all people experience low back problems at some point in their lives, and many are at risk for developing long-lasting pain and disability. Although psychosocial factors have long been thought to be associated with chronic pain only, more recent research focuses on psychosocial factors in association with acute or subacute pain. Evidence suggests that psychosocial factors have an influence on the outcome of physical therapy treatment and that the extent of their influence differs considerably among LBP patients.

This study enrolled patients with complaints of acute/subacute LBP. Patients were randomly assigned to an outpatient rehabilitation program into a Fear avoidance treatment (education) group (n=37) or usual PT care or control group (n=39). Variables of interest will be assessed at the baseline, after 6 weeks, and after 3 months. The study compared the outcomes of patients with acute/subacute LBP who receive usual care PT versus those receiving the fear avoidance education treatment. Repeated measure one-way ANOVA was used to compare between the groups for baseline, six weeks, and three months for the primary and secondary outcomes. We examined the effects of time and treatment group on primary outcomes (PNRS and ODI) and secondary outcomes (PCS and FABQ; physical and work sub-scale) with a repeated measure ANOVA. There was

no significant mean difference between the groups for the primary and secondary outcomes $p > .05$. The nature of the interaction was that the participants in the education group and the participants in the usual care group did not change significantly. The within subject test of the FABQ physical subscale showed that the interaction of time and group was significant indicating there was a difference between the groups across time, $F(1.71, 126.87) = 3.55$ $p = .038$. Conclusion: education did not reveal any significant effects in pain, disability and fear for both education and usual care groups who had an episode of acute and subacute LBP. There was a significant overall effect of physical subscale FABQ throughout the time favoring the educational group.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ALBP	Acute Low Back Pain
BMI	Body Mass Index
CLBP	Chronic Low Back Pain
FABQ	Fear-Avoidance Beliefs Questionnaire
FABQ-PA	Fear-Avoidance Beliefs Questionnaire – physical activity scale
FABQ-W	Fear-Avoidance Beliefs Questionnaire – work scale
FAM	Fear-Avoidance Model
LBP	Low Back Pain
MRI	Magnetic Resonance Imaging
NPRS	Numerical Pain Rating Scale
NSALBP	Nonspecific Acute Low Back Pain
NS-LBP	Nonspecific Low Back Pain
ODI	Oswestry Disability Index
PI	Primary Investigator
RCT	Randomized Controlled Trial
SD	Standard Deviation

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CHAPTER 1

INTRODUCTION

1.1 Low Back Pain

Low back pain (LBP) is one of the common disabling conditions experienced by individuals through the world and the lifetime prevalence of LBP was reported about 84%.[1] A type of LBP, which occurs in the absence of an identifiable cause, is called nonspecific LBP.[2] Low back pain is a common cause of disability in western societies and incurs high costs, estimated at over 50 billion dollars in the United States of America.[3] Recent North Carolina data indicate that the prevalence of acute and chronic LBP has increased 44% and 162%, respectively, over a 14-year period.[4] Furthermore, approximately 25% of the caseload in outpatient physical therapist practice is LBP related.[5-7] The point prevalence of LBP is stated to be between 15% and 30%, the 1-year period prevalence between 15% and 45%, and a lifetime prevalence of 50% to 80%.[8-10]

1.2 Nonspecific Low Back Pain

Nonspecific low back pain (NSLBP) has been widely described as pain or discomfort that is localized below the costal margin and above the inferior gluteal folds, with or without leg pain, but not attributable to a known or specific pathology.[11]

Diagnosing NSLBP implies that the pain is not related to conditions such as fractures, spondylitis, direct trauma, or neoplastic, infectious, vascular, metabolic, or endocrine-related processes.[12] The prevalence of NSLBP is very high among the general population, and 60–70% of adults are believed to have suffered this problem at some time.[13] Acute low back pain is of nonspecific musculoskeletal origin in 95% of cases.[14]

1.3 Acute Low Back Pain and Sub-acute Low Back Pain

Acute pain (ie, pain with a sudden onset, often stemming from some form of illness process or tissue injury) is adaptive in that it signals potential for actual damage and motivates action to limit damage and promote recovery. Acute pain experiences subside with physical recovery, but for some, acute pain transitions through a complex interaction of biological, psychological and social processes to become chronic. Chronic pain is typically defined as pain persisting longer than 3 months.[15] LBP is considered to be acute when symptoms have been present for up to 1 month, subacute when symptoms have been present for 1 to 3 months, and chronic if the symptoms have been present for more than 3 months.[16] Some other authors define acute low back pain as 6 to 12 weeks of pain between the costal angles and gluteal folds that may radiate down one or both legs.[17] Subacute low back pain was defined as an episode of low back pain occurring during the previous 7 days to 7 weeks.[18]

1.4 Acute Nonspecific Low Back Pain

Acute nonspecific low back pain (acute NSBP) is considered a benign self-limiting disease, with a recovery rate of 80–90% within 6 weeks in the open population,

irrespective of the type of management or treatment.[19] However, Pengel and his colleagues found in a systemic review that rapid improvements in pain (mean reduction 58% of initial scores), disability (58%), and return to work (82% of those initially off work) occurred in one month. Further improvement was apparent until about 3 months. Thereafter levels for pain, disability, and return to work remained almost constant. 73% of patients had at least one recurrence within 12 months.[20]

1.5 Psychological Factors

From the 1980s, the attitudes and beliefs of patients have been recognized as important in the development of back-related disability.[21-24] There is now convincing evidence that psychosocial factors, more than biomedical or biomechanical factors, are strongly linked to the transition from acute to chronic back pain disability.[25] Psychosocial factors have been shown to play an important role in the development of chronic low back pain (LBP).[26] Psychosocial factors have been shown to play an important role in the transition from acute to chronic LBP.[27] Early interventions focusing on these factors are assumed to prevent chronic LBP.

The understanding of psychological processes that underlie the development of a chronic pain problem is important to improve prevention and treatment. Today, it is well known that psychological factors play a significant role in the development of chronic pain and disability.[28] Guidelines [29,30] recommend that health professionals consider and screen for psychological factors. Yet many of these may be both important obstacles to recovery as well as potentially modifiable through clinical interventions.[25,31] These include fear avoidance,[28,32,33] catastrophizing[34-36] or perceptions about risk of

persistence,[37] depression,[34,37] self-efficacy,[23] expectations,[38] beliefs about the future [23] and patients' illness perceptions regarding their back problem.[39]

Several researchers have specifically explored the effects of intervention on psychosocial status, or the influence of psychosocial factors on treatment outcomes.[40-42] Wand and his colleagues [43] found that early intervention (compared to leave alone) had greater improvements in terms of disability, mood, general heath and quality of life at six weeks, and whilst disability and pain showed no greater difference in improvement between groups at six months, mood, general health, and quality of life remained significantly improved. A systematic review found that there is strong evidence that psychosocial factors play an important role in chronic low back pain and disability, and moderate evidence that they are important at a much earlier stage than previously believed (level A).[25]

Pain-related fear and pain catastrophizing are believed to be important factors for disability. A number of studies have shown that pain-related fear is a strong predictor of self-reported disability in both acute and chronic LBP.[32,44,45] Several studies support the notion that in patients with chronic LBP pain-related fear is significantly associated with restricted physical performance.[32,46,47] Among factors related to the onset and persistence of chronic LBP, psychosocial factors may play a pivotal role in the development of disability. [27] Several authors have supported the theory that Fear avoidance beliefs may be the most important cognitive factors in the development of chronic disability in patients with LBP.[32,48,49]

Research studies have indicated that the critical impact of education rests on physiotherapists' ability to effectively help their clients develop skills in self-

management.[50] Although psychosocial factors have long been thought to be associated with chronic pain only, more recent research focuses on psychosocial factors in association with acute or subacute pain.[25] Psychological factors are related to both the onset and development of spinal pain and disability.[25] Psychosocial factors have been shown to be associated with the development of disability with cLBP,[51] and the best individualized factors are anxiety, depression, coping, and fear of and belief about pain.[24] Providing advice to stay active and information about how to cope with pain has been shown to modify patients' fears, avoidance attitudes and beliefs.[52,53]

This chapter was about LBP and how it is common in society. The emphasis was in nonspecific acute and subacute LBP. Then we explained what is the role of psychological factors in the development of chronic LBP and how important it is to address it in early stages. Later on in the chapter, we showed the association between fear, disability, and LBP, and how education might be beneficial.

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CHAPTER 2

FEAR AVOIDANCE MODEL

2.1 Important

An important element of LBP that has received increased attention is fear of pain, which has been shown to be associated with avoidance of physical activities. An increasing number of studies have been conducted concerning the influences and consequences of pain-related fear and its associated avoidance behavior in the development and maintenance of chronic disabling LBP.[1,2]

Some studies showed that the fear-avoidance beliefs are related to the onset of a LBP episode and that pain-related fears as well as negative appraisals about pain (pain catastrophizing) predict future disability and health status.[3-5] Poiraudeau et al showed that patients with subacute LBP who have high fear-avoidance beliefs about physical activities and back pain have a low level of education and high perceived disability and see physicians' with high fear-avoidance beliefs about back pain.[6] The subacute phase, which is the transition period from acute (duration less than 6 weeks) to chronic (duration over 3 months) LBP.

Fear-avoidance beliefs and catastrophizing have been shown to be powerful cognitions in the process of developing chronic pain problems, and there is a need for

increased knowledge in early stages of pain.[5] Elevated fear-avoidance beliefs are a maladaptive emotional response toward an excessive fear of pain that can eventually lead to avoidance behavior.[7] In a subset of patients with low back pain, development of fear resulted in avoidance of actual or perceived pain-generating physical activities and led to worsening performance and recovery after injury.[8] The fear of pain is an important aspect in patients' disability, which needs to be addressed in order to achieve a successful outcome.[9] Among patients with low-back pain (LBP), it has been reported that a patient's fear of pain may be more disabling than the pain itself.[10] It has further been suggested that early identification of fear-avoidance behaviors can lead to appropriate management strategies, resulting in decreased chronicity in patients with LBP.[11,12]

The role of fear of pain and subsequent avoidance behaviors has been succinctly summarized by Waddell and colleagues with the statement "Fear of pain and what we do about it may be more disabling than the pain itself." [8] Several other authors have supported the theory that fear-avoidance beliefs may be the most important cognitive factors impacting the development of chronic disability in patients with LBP.[10,13]

2.2 Fear Avoidance Model

The fear-avoidance model of chronic musculoskeletal pain has become an increasingly popular conceptualization of the processes and mechanisms through which acute pain can become chronic.[14] Waddell et al developed the Fear-Avoidance Beliefs Questionnaire (FABQ) based on the Fear-Avoidance Model. The questionnaire is designed to quantify a patient's beliefs about how physical activity and work may affect his or her pain and risk of (re)injury. In validating this instrument, Waddell et al reported

that fear-avoidance beliefs about work explained a substantial amount of the variance in disability and work loss, even after controlling for pain intensity and location.[8]

The fear-avoidance model proposes an explanation of why some patients with back pain develop chronic disability. Patients with a high level of pain-related fears develop a catastrophic interpretation that activity will cause injury and exacerbate the pain.[7,15] Fear-avoidance beliefs of LBP patients predicted disability in daily or occupational activity, treatment outcome, and patients' return to work after a functional restoration program.[8,16]

2.3 The Questionnaire

Waddell and his collogues [8] showed that the Fear Avoidance Beliefs Questionnaire (FABQ) is a commonly used measure of pain-related fear for patients with low back pain. The FABQ measures ''fear-avoidance beliefs,'' which are theorized to be a quantification of an individual's fear of pain and beliefs about the need to change behaviors to avoid low back pain. However, closer inspection of FABQ items suggests they do not directly tap fear, anxiety, or related avoidance concepts.

Despite this content-related concern, clinical investigations involving the FABQ have consistently provided an empirical link between fear-avoidance beliefs and disability from low back pain. Specifically, the FABQ has been positively associated with concurrent measures of disability and work loss in patients with chronic low back pain. The FABQ also has been linked to future disability in patients with acute low back pain, with elevated fear-avoidance beliefs being predictive of more disability at 4 weeks and 8 weeks following low back injury.[17,18] Vlaeyen and Linton [19] stated that it was difficult to identify specific mechanisms by which acute/subacute problems become chronic;

however, recent scientific evidence argues that pain-related fears might contribute to the transition between acute/subacute and chronic pain.[20]

2.4 Patients' Beliefs and Fear Avoidance of Physical Activity

Many patients whose back pain started with an acute episode of severe pain believe that something (perhaps the disc) is out of place and with the wrong movement could come out. One of the first aims of patient education should be to dispel misconceptions like these, which may act as a barrier to recovery. Frequently this may relate to the cause of the problem as perceived by the patient. Misconceptions need to be replaced with an explanation that is credible and will provide the patient with confidence to carry out physical activities.[21]

2.5 The Psychological Model

Originally introduced by [22] Lethem et al, the Fear-Avoidance Model (FAM) of Musculoskeletal Pain is one specific psychological model that provides a potential explanation as to why some individuals develop chronic LBP after an episode of acute LBP.[20] The FAM consists of multiple psychological constructs (eg, pain catastrophizing, fear of pain, and pain anxiety) that are associated with the development and maintenance of chronic musculoskeletal pain conditions.

Fear of movement/(re)injury has been reported to be strongly associated with activity limitations, often stronger than pain severity.[15,23] The fear-avoidance model predicts that when patients with an acute back pain problem interpret their pain as threatening (they catastrophize about their pain), fear of movement/(re)injury emerges.

The expectation of adverse consequences of increasing their physical activity level (‘‘I may end up in a wheelchair’’) may be the reason to avoid physical activities. In the long run, long-lasting avoidance behavior can result in both disability and disuse, Figure 1. The latter has been defined as performing at a reduced level of physical activity in daily life.[24] An important element of LBP that has received increased attention is fear of pain, which has shown to be associated with avoidance of physical activities. An increasing number of studies have been conducted concerning the influences and consequences of pain-related fear and its associated avoidance behavior in the development and maintenance of disabling LBP.[1,19]

Fear-avoidance beliefs have been identified as an important psychosocial variable in patients with chronic disability due to low back pain. Fear-avoidance beliefs are present in patients with acute low back pain, and may be an important factor in explaining the transition from acute to chronic conditions.[17] Fear-avoidance models have been proposed to describe how specific psychosocial factors influence the development of chronic low back pain. These models differ on individual components, for example, one highlights the importance of fear of pain,[7] whereas others highlight pain catastrophizing [2] and psychophysiological arousal. However, a common link among fear-avoidance models is the theoretical relationship between pain-related fear and disability. Collectively, these models propose that when experiencing low back pain, higher pain-related fear is associated with the development of avoidance behavior, eventually leading to more disability.

2.6 Fear of Movement

Vlaeyen and his colleuges[15] suggested a more specific form of fear-avoidance, namely fear of movement/(re)injury. A chain of reactions including catastrophizing and avoidance can lead to disuse, disability and depression, creating a vicious circle. The (non)catastrophizing and confronting alternative would promote recovery.

Pain-related fear is part of the Fear-Avoidance Model,[7,13] the most specific "fear-avoidance model of exaggerated pain perception" in chronic low back pain. Fear-avoidance beliefs of LBP patients predicted disability in daily or occupational activity, treatment outcome, and patients' return to work after a functional restoration program.[16] High scores on the Fear-Avoidance Beliefs Questionnaire (FABQ),[8] a validated two-part questionnaire, which examines the role of fear in physical activity and work, have been attributed to the maintenance of both chronic pain and pain-related disability.[25]

The recent model of fear of movement/(re)injury explains how negative attitudes and beliefs about pain, in particular catastrophic interpretations of a pain experience, can lead to avoidance of movements or activities, which, in turn, contributes to maintenance or exacerbation of fear, disuse, distress, and disability.[15]

The FAM proposes that pain-related fear (including fear of movement and (re)injury) and pain catastrophizing are the primary affective and cognitive components influencing pain perception. These factors interact to determine the individual's initial behavioral response to pain, which can range from avoidance (maladaptive) to confrontation (adaptive). Long-term avoidance behavior has been hypothesized to have adverse psychological, physical, and societal consequences.[19]

The contemporary fear-avoidance model of chronic musculoskeletal pain stems

from two independent reviews published in close temporal proximity at the turn of the millennium.[1,2] These reviews, while differing somewhat in focus, provided a historical account and critique of a growing body of literature supporting the role of fear and anxiety as factors responsible, at least in part, for the maintenance of disabling musculoskeletal pain experienced by some people. The fear-avoidance model of chronic musculoskeletal pain can be summarized as follows. Pain resulting from an injury is perceived and appraised with respect to its significance and meaning. Depending on the nature of the appraisal, the person may respond in an adaptive or potentially maladaptive manner. For most people, the pain is judged to be undesirable and unpleasant, but not catastrophic; accordingly, most people engage in appropriate behavioral restriction followed by graduated increases in activity until healing has occurred. For a significant minority of people, a catastrophic meaning (ie, "This pain means I'm never going to be able to do the things I like doing") is placed on the pain experience. Catastrophizing – influenced by predispositional and current psychological factors – results in fear of pain and pain-related anxiety. For some people with chronic pain, this anxiety spirals into a vicious and self-perpetuating cycle that may promote and maintain avoidance, functional disability, depression, and additional pain and catastrophizing.

2.7 Catastrophizing

Sullivan et al [26] defined catastrophizing as an exaggerated negative orientation toward noxious stimuli. Catastrophizing can result from past experiences perceived as negative or from threatening information coming from the environment, causing fear and anxiety. To manage these negative emotions, a person avoids any movement or activity

likely to elicit pain and, therefore, anxiety. This maladaptive strategy reduces the anxiety in the short term; however, over time it maintains and cultivates fear, leads to reduced physical fitness, increases functional disability, and generates depressive symptoms.[2,27]

Catastrophizing is considered to be an exaggerated and negative orientation toward pain stimuli and pain experience; individuals who catastrophize expect that they will cause a new episode of pain or injury, thus fuelling fear of motion. Catastrophizing in back pain patients has been seen to be both a significant and independent predictor of response to treatment and development of chronicity.[5] Within the fear-avoidance model, Catastrophizing is postulated to affect an individual by increasing fear of activity and possibly increasing the risk of subsequent psychological distress and depression.[28]

Catastrophizing, which is said to be the exaggerated and negative orientation toward pain, may have a role as a mediator to pain.[26,29,30] Individuals who catastrophize, expect that they cause a new episode of pain or activate an earlier injury. That could create fear of movement and reinforcement of avoidance behavior.[5]

2.8 Pain and Disability

Low back pain (LBP) is a common clinical problem and the lifetime prevalence of back pain is 60-80%. LBP has become a major medical, social and economic problem.[8] Low back pain is extremely common, ranking as the second most common symptomatic reason for office visits in the United States.[31,32] About one-third of adults in the United States report back pain during the past 3 months,[31] and nearly three-quarters of adults report at least one episode of low back pain during their lifetime.[33] Low back pain (LBP) is recognized as a leading cause of disability in working populations.[34,35]

Pain is one of the most powerful aversive drives in animals and humans and it is closely allied to fear. Pain and its association with fear have been described using a variety of conceptual definitions among which pain-related fear, fear of movement, and kinesophobia are the most commonly used.[9] In a subset of patients with low back pain, development of fear can result in avoidance of actual or perceived pain-generating physical activities and lead to worsening performance and recovery after injury.[8] The fear of pain is an important aspect in patients' disability, which needs to be addressed in order to achieve a successful outcome.[9]

Disability is proposed to be an important outcome in pain research,[36] and 30% of persons with neck, shoulder, or back pain may be expected to report disability in activities of daily life.[37] Psychological factors are related to both the onset and development of spinal pain and disability.[38]

Pain-related fear is part of the Fear-Avoidance Model. [7] The Fear-Avoidance Model has been used to explain the development of unfavorable pain experiences and behaviors. [39] Troup et al outlined the most specific "fear-avoidance model of exaggerated pain perception" in chronic low back pain.[13] Vlaeyen and Linton proposed a fear-avoidance belief model (FABM) of chronic low back pain (CLBP) that attempts to explain both the transition from acute to chronic pain and the maintenance of pain once it has become chronic.[2] The basic assumption is that the process of chronicity is frequently triggered by catastrophic perceptions of the pain experience that initiate a vicious cycle of fear about pain and (re)injury associated with safety-seeking behaviors such as avoidance and hypervigilance.

Avoidance behavior was found to be strongly related to fear-avoidance beliefs.

Al-Obaidi et al showed that pain-related fear was associated with decreased speed in walking and weakened muscle strength.[40] Geisser et al found an association with diminished performance of physical tasks, and Pfingsten et al also showed a diminished physical task performance in an experimental study.[41,42] Moreover, both in home and in work situations, studies provided evidence that CLBP patients with heightened levels of pain-related fear report increased disability.[43-47]

2.9 Confrontation and Avoidance

The response of an individual experiencing acute pain has been hypothesized to fall along a continuum between two extremes: confrontation or avoidance.[48] Where on this continuum an individual patient will fall is determined by his or her fear of pain.[7,49] Confrontation is generally considered to be an adaptive response, in which the individual views pain as a nuisance and has strong motivation to return to normal levels of activity. This response is seen as gradually leading to a reduction in fear and a return to normal activity.[7] Avoidance is a maladaptive response causing the patient to avoid certain activities that are anticipated to cause an increase in pain and suffering.[23] An avoidance response may lead to a reduction in physical and social activities, an exacerbation of the fear and avoidance behaviors, prolonged disability, and adverse physical and psychological consequences.[7,15,39]

An individual's fear of pain and the degree to which he or she will seek to avoid painful experiences or behaviors is conditioned by the psychological context within which the painful event occurs. Four factors have been identified as influencing the psychological context: previous stressful life events, personal pain coping strategies, prior

pain experiences, and personality characteristics.[7,18,49] Each of these factors is mostly in place in an individual prior to the onset of the painful episode, leading some researchers to conclude that the tendency to fear pain and avoid activities perceived to cause pain may be more related to the expectation of pain with certain activities, or a disposition to respond fearfully to a troubling situation, rather than an actual experience of pain exacerbation with the activity during the current painful episode.[50] If fear of pain and subsequent avoidance behavior are largely determined by personality traits and experiences predating the onset of pain, the assessment of the fear of pain in patients soon after the onset of pain may be useful for detecting these factors and predicting the subsequent course of recovery.[8,49]

2.10 Fear and Disability

Several fear-avoidance models have been proposed to describe how specific psychosocial factors influence the development of chronic low back pain. These models differ on individual components; for example, one highlights the importance of fear of pain,[7] whereas others highlight pain catastrophizing[2] and psychophysiological arousal.[51] However, a common link among fear-avoidance models is the theoretical relationship between pain-related fear and disability. Collectively, these models propose that when experiencing low back pain, higher pain-related fear is associated with the development of avoidance behavior, eventually leading to more disability.[2,7,51]

According to the fear-avoidance model,[2] pain may induce negative appraisals (eg, catastrophizing, anxiety, depression), fear of pain, and fear of movement beliefs (ie, kinesiophobia), which, in turn, may lead to illness behavior and subsequent disability

characterized by poor cognitive and physical performances (ie, disuse syndrome). This induces subjects to sacrifice other tasks, such as everyday activities or the voluntary use of coping strategies, thus increasing the pain experience and creating a dangerous vicious circle of disability and pain.[52]

Activity intolerance is a problem that is often reported by patients with chronic low back pain (CLBP). As a result of their back pain, they perceive a disabling reduction of their level of physical activity. Fear of movement/(re)injury has been reported to be strongly associated with activity limitations, often stronger than pain severity.[10,15]

2.11 Self-efficacy

Self-efficacy is the belief in one's capabilities to organize and execute the actions required to manage prospective situations. It has been suggested that for people who feel that they can accomplish tasks, where this belief is stronger than any FAB they hold, they will confront their pain, and more than likely, remain active. This could make them less likely to become locked into the cycle of fear, avoidance, disuse and pain.[53,54]

The fear avoidance model was proposed to explain why patients who are experiencing noxious or threatening stimuli reduce their activities.[7] In this model, initial adaptive responses to threat become, over time, maladaptive and are termed avoidance behaviours, which have the potential to increase fear and pain and limit activity. Based on this theory [2] Vlaeyen and Linton proposed a model of chronic low back pain where a patient's catastrophic thoughts and fear of movement beliefs can lead to low back disability. Both of these models have been proposed to explain how pain can lead to disability for patients with low back pain.[19,55]

Self-efficacy refers to an individual's belief in his or her ability to perform certain physical tasks or meet specific situational demands.[56] The presence of pain significantly influences physical performance, causing a patient to restrict or totally avoid activities that aggravate their symptoms, which in turn impacts self-confidence to perform such activities.[57-59]

Psychological factors play a critical role in the rehabilitation process. Although many factors need to be considered in managing persons with low back pain (LBP),"self-efficacy" may be the most promising psychological or cognitive construct for guiding therapy.[58] Individuals with low self-efficacy tend to exaggerate pain avoidance behaviours and reinforce disability.[60] Fear-avoidance belief has gained increasing attention in chronic low back pain (LBP) research.[19,40,61] Based on the theory of social learning, self-efficacy describes the confidence the person has in his or her own ability to achieve a desired outcome.[62]

Higher levels of self-efficacy have been found to be associated with lower levels of pain and disability in patients with chronic pain.[54,63] Nicholas et al demonstrated that pain-related self-efficacy ratings are likely to change following cognitive behavioural management of low back pain, and that these changes were associated with better outcomes such as reduced disability.[64]

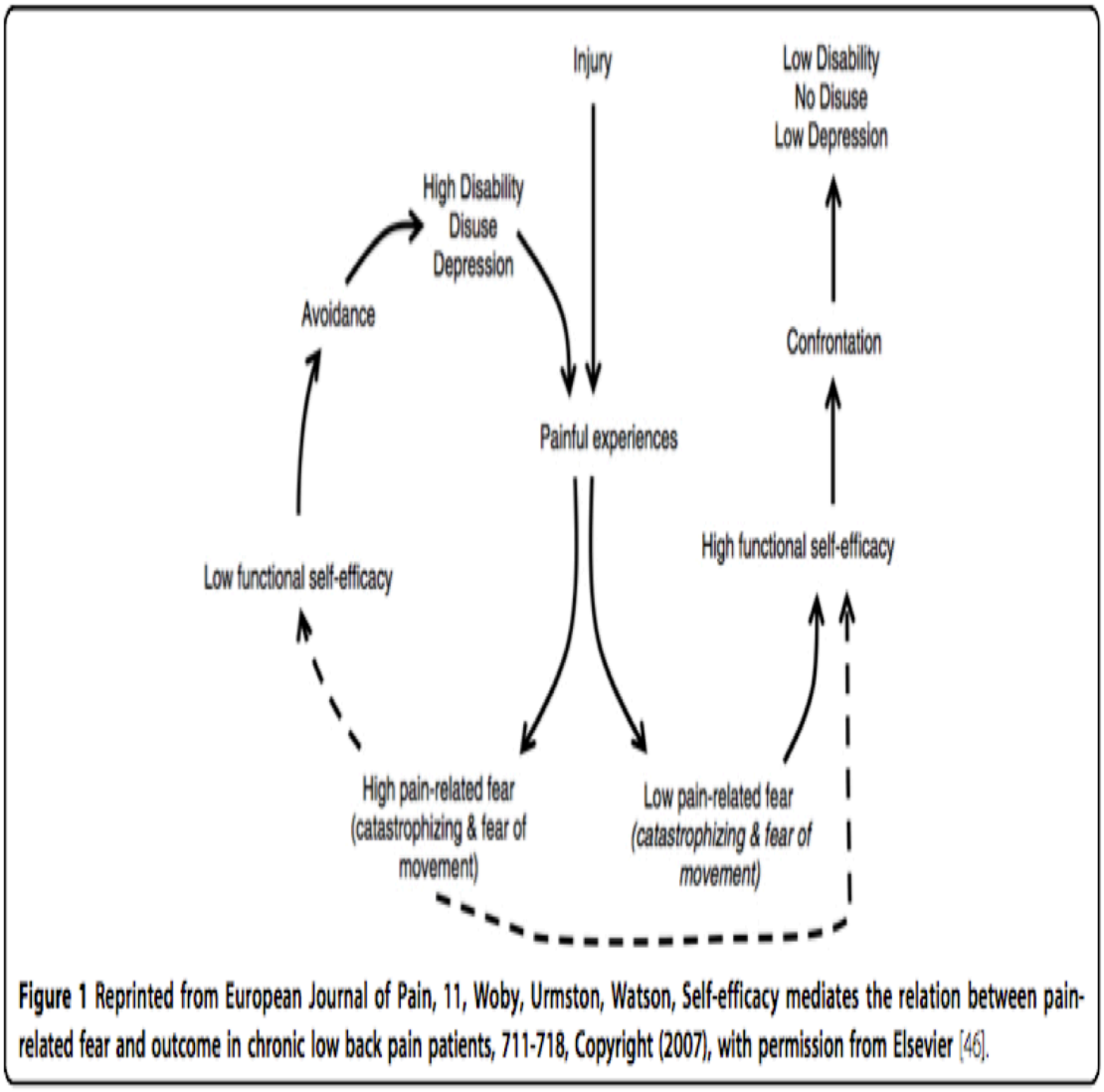

Figure 1 Reprinted from European Journal of Pain, 11, Woby, Urmston, Watson, Self-efficacy mediates the relation between pain-related fear and outcome in chronic low back pain patients, 711-718, Copyright (2007), with permission from Elsevier [46].

Figure 1 Fear Avoidance Model

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CHAPTER 3

TREATMENT OF LOWER BACK PAIN

3.1 Education

Educational interventions for patients with LBP have been given more attention since the Swedish Back School was introduced in 1969.[1] This treatment program was based on current knowledge about the intervertebral disc, spinal anatomy and physiology, and ergonomic principles.[2] Patients were taught how to protect spinal structures in daily activities. Later, exercises were included,[3] and back schools were incorporated in comprehensive multidisciplinary programs or functional restoration.[4]

Educational interventions are often designed to help patients understand the nature and causes of LBP. Observations of natural history and epidemiology suggest that low back pain usually is a benign, self-limiting condition. Waddell contrasted the traditional medical model of disease with a biopsychosocial model of illness to analyze success and failure in back pain disorders.[5] Waddell emphasized the importance of educating patients about how psychosocial factors can impact LBP. Inspired by Waddell, Indahl et al educated patients that a possible crack in the disc might cause reflex muscle activation, but that light activity would not further injure the disc or other structures.[6] The program advocated by Indahl supplemented the clinical examination with a brief

education given by a physiatrist, physiotherapist (PT), or nurse, and patients were given guidelines and told to set their own goals. It was emphasized that the worst thing they could do to their back was to be too careful. The link between emotions and chronic low back pain (CLBP) was explained as increased tension in the muscles. Later, brief education has been managed in the physiotherapy setting.[7,8] The value of pure educational approaches has been challenged.[9]

In 1987, Waddell showed that the view on nonspecific LBP has changed during the past two decades from a purely "injury model" to a "biopsychosocial" understanding of the condition.[5] In this model, back pain arises from nociception of pain in the back caused by reasons or tissue injury that cannot be identified. The pain may result in varying degrees of dysfunction, not necessarily only related to the magnitude of the injury, but also to how the pain is perceived. The second element of this model is how the patients think and feel about the dysfunction, thus determining how it affects them. This involves beliefs and coping strategies. The degree of anticipation, anxiety, attention, and previous experiences reflect our perception of the pain, leading in turn to beliefs that determine how we manage to cope with the actual pain.

Treatment options for LBP in primary care are diverse. Patient education has a long history as an integral part of clinical practice and is increasingly seen as an important intervention.[5,10] Patient education has been defined as a "systematic experience in which a combination of methods is generally used, such as the provision of information and advice and behaviour modification techniques, which influence the way the patient experiences his illness and/or his knowledge and health behaviour, aimed at improving or maintaining or learning to cope with a condition, usually a chronic one."[11]

Providing information is the central focus in educational activities. The information given by a health-care provider is of the most importance since it may help to prevent unnecessary use of health care and enhances self-care and the use of active coping strategies.[10,12] Cherkin stated that "the aim of patient education with regard to nonspecific low-back pain is to improve patients' understanding of their back problems and what they should do about them; to reduce unwarranted concern about serious outcomes; and to empower patients to take actions that should expedite a return to normal activities, reduce the risk of subsequent back problems, and minimize dependency on health care providers."[9]

Patient education has been a prominent part of the care of low back pain (LBP) for the past two decades based on the belief that recovery from LBP can be enhanced if those who experience LBP better understand the nature of their problem(s).[13] Recent clinical guidelines panels have based their educational recommendations on evidence that inactivity and belief that LBP is a serious problem greatly interfering with recovery.[14-16] Some studies have shown that a change in education approach has a positive influence on management of LBP. For example, advice to stay active and resume normal activities was found to be more effective than usual medical care for LBP in separate randomized trials.[6,17,18]

Lethem et al introduced the fear-avoidance model in 1983, and a questionnaire for measurement of fear-avoidance beliefs was published in 1993.[19,20] The central concept of the model is fear of pain. Confrontation and avoidance are postulated as two extreme responses to fear, of which the former leads to reduction of fear over time.[21] Avoidance leads to maintenance and exacerbation of fear, which may generate a fearful or phobic

state. Physical performance and self-reported disability are associated with cognitive and behavioral aspects of pain, in addition to sensory and biomedical ones.[22-24]

Patients' attitudes and beliefs, particularly fear avoidance beliefs and passive coping strategies, are increasingly accepted as having an important role in disability related to back problems,[20,25-27] as is management based on the bio-psychosocial model.[5] Other psychosocial factors that have been shown to be associated with the development of disability with cLBP [28] include anxiety, depression, coping, and fear of and belief about pain.[20] Providing advice to stay active and information about how to cope with pain has been shown to modify patients' fears, avoidance attitudes, and beliefs.[29,30] Evidence suggests that giving patients advice about staying active and coping with pain is the most effective strategy to decrease the rate of patients experiencing chronic pain and reduce the impact of LBP on daily and occupational activities.[9,31]

Providing information to the patients is considered as a crucial issue for the treatment of LBP. Studies show that a patient's understanding of his or her pain significantly predicts treatment success.[32] However, in general, patients are dissatisfied with the information they receive from healthcare professionals, especially regarding the natural history of back pain, diagnosis, and treatment.[33] Patient information is often based on a physician's assumptions of what patients may want or need to know, yet these assumptions are often incomplete or incorrect.[34,35] Other barriers to adequate information are the use of medical, legal, and other jargon, care provider's lack of time, lack of communication skills, and attitudes to back pain patients.[36] Therefore, patients tend to access information from a variety of other sources, which are often contradictory, may conflict with research evidence and can lead to maladaptive beliefs about LBP and its

consequences.[37] These beliefs may contribute to build a negative orientation toward pain (catastrophizing) and a fear of movement/ (re)injury (kinesiophobia) may in turn increase the risk of a transition from acute to chronic LBP.[38]

Providing information to the patient has numerous objectives and desired outcomes: to increase satisfaction, knowledge, and understanding, to reduce anxiety and pain, to avoid consequences of pain like fear avoidance, catastrophism, and kinesiophobia, to reduce the risk of chronicity by addressing a patient's beliefs and related behaviors, and to increase patient empowerment.[10,39,40] Patient information materials, such as leaflets, booklets, books, videos, computer and Internet-based information, have notably in- creased over recent years.[41-44] A systematic review on patient education programs for chronic LBP (such as back schools, brief education, and fear-avoidance training) recommended brief education programs in clinical settings.[45] In 14 trials (n = 4872) of patient education interventions, trials assessed reassurance with questionnaires of fear, worry, anxiety, catastrophization, and health care utilization. Traeger et al found that there is moderate- to high-quality evidence that patient education increases reassurance more than usual care/control education (manual therapy and traditional educational booklet) in the short term.[46]

3.2 Education, Staying Active and Avoiding Bed Rest

Modification of health behaviors can lead to the prevention of many diseases that are associated with significant morbidity and mortality in the United States.[47-49] Patient educational interventions that seek to promote healthy behaviors have the potential to

improve individuals' overall wellbeing.

Evidence-based guidelines for the management of acute low back pain (ALBP) have been formulated by the Health Authorities of a number of countries.[50] Clear evidence has emerged that "advice on staying active" and appropriate drug therapies are effective interventions for ALBP and that bed rest and general back exercises are not.[51,52] A randomized, controlled study compared health education plus exercise with exercise alone for the treatment of chronic low back pain, and found that health education provided additional benefits in terms of pain severity, disability and physical and mental health-related quality-of-life compared with exercise alone.[53]

It seems that the main aim of patient education should be to help the patient take control of his problem so that he can get back to his normal activities. Physical Therapists are very well placed to help their patients do this, using not only their biomechanically based skills, but also their ability to reach an understanding with the patient. Effective communication skills are an essential part of this process, which can be considered to be in three parts:

- Finding out about the problem from the patients' perspective and, in particular, eliciting any concerns or fears about their back pain problem.
- Providing a response to these concerns to reassure the patient.
- Using a problem solving approach to encourage patients to achieve their goals and resume their normal activities.[54]

3.3 Fear and Education

Previous studies have evaluated booklets with biopsychosocial information provided by a general practitioner, but these did not have beneficial effects on disability or pain.[9,30,55] Only one of these studies reported a significant effect in a subgroup of patients with initially strong fear-avoidance beliefs. [30] The key principles described in the back book are for people to acknowledge that (1) LBP does not suggest the presence of a serious disease; (2) the spine is strong, and pain does not necessarily mean that the spine is damaged; (3) lasting pain relief depends on what people do and not on medical treatments; (4) activity is essential for restoring normal function and fitness; and (5) positive attitudes and coping skills are helpful [56] contended that this physical therapy approach has the potential to reduce fear-avoidance beliefs and disability in people with acute LBP and fear-avoidance beliefs.

3.4 Imaging in Patients with Lower Back Pain

3.4.1 Causes, Red Flags, Cost and Correlation

Acute low back pain is often nonspecific and therefore cannot be attributed to a definite cause. However, possible causes of acute low back pain (eg, infection, tumor, osteoporosis, fracture, inflammatory arthritis) need to be considered based on the patient's history and physical examination.[57,58]

Acute low back pain is one of the most common reasons for adults to see a family physician. Although most patients recover quickly with minimal treatment, proper evaluation is imperative to identify rare cases of serious underlying pathology. Certain red flags should prompt aggressive treatment or referral to a spine specialist, whereas

others are less concerning. Serious red flags include significant trauma related to age (ie, injury related to a fall from a height or motor vehicle crash in a young patient, or from a minor fall or heavy lifting in a patient with osteoporosis or possible osteoporosis), major or progressive motor or sensory deficit, new-onset bowel or bladder incontinence or urinary retention, loss of anal sphincter tone, saddle anesthesia, history of cancer metastatic to bone, and suspected spinal infection. Without clinical signs of serious pathology, diagnostic imaging and laboratory testing often are not required. Although there are numerous treatments for nonspecific acute low back pain, most have little evidence of benefit. Patient education and medications such as nonsteroidal antiinflammatory drugs, acetaminophen, and muscle relaxants are beneficial. Bed rest should be avoided if possible. Exercises directed by a physical therapist, such as the McKenzie method and spine stabilization exercises, may decrease recurrent pain and need for health care services.[59]

Imaging is not warranted for most patients with acute low back pain. Without signs and symptoms indicating a serious underlying condition, imaging does not improve clinical outcomes in these patients.[60,61] Even with a few weaker red flags, 4 to 6 weeks of treatment is appropriate before consideration of imaging studies.[60,62] If a serious condition is suspected, magnetic resonance imaging (MRI) is usually most appropriate. Computed tomography is an alternative if MRI is contraindicated or unavailable. Clinical correlation of MRI or computed tomography findings is essential because the likelihood of false-positive results increases with age.[63-65] Radiography may be helpful to screen for serious conditions, but usually has little diagnostic value because of its low sensitivity and specificity.

Low back pain is also very costly. In 1998, total health care expenditures for individuals with back pain in the United States were estimated at $90 billion,[66] and costs have since risen. Lumbar spine imaging (plain radiography, CT, and MRI) is often performed in patients with low back pain. Although clinical practice guidelines recommend imaging only in the presence of progressive neurologic deficits or signs or symptoms suggesting a serious or specific underlying condition,[67] imaging is often performed in the absence of a clear clinical indication for it.[68] This fact is concerning, because routine imaging does not seem to improve clinical outcomes, exposes patients to unnecessary harms, and contributes to the rising costs associated with low back pain.[60,61,69] Eliminating unnecessary tests would help rein in costs associated with low back pain while maintaining high-quality care.[70] Overuse of low back imaging has long been noted as a problem.[71]

The ultimate goal of any diagnostic test is to improve clinical outcomes. Most studies of diagnostic tests estimate how accurately they can identify a disease or condition, or how well the test provides prognostic information. However, even accurate tests do not necessarily result in improved patient outcomes. The ultimate effects of diagnostic testing depend on how clinicians and patients use the test results, the effectiveness of subsequent treatments, and harms related to the diagnostic test and subsequent tests and treatments. Well-conducted randomized trials are at the top of the diagnostic evidence hierarchy because they provide the most direct information about the clinical benefits and harms of alternative testing strategies.[72-74]

One of the reasons that routine imaging is not beneficial is that most lumbar imaging findings are common in people without low back pain. In fact, these imaging

findings are only weakly associated with back symptoms. A systematic review reported odds ratios that ranged from 1.2 to 3.3 for the association between low back pain and disc degeneration on plain radiography, and no association with spondylosis or spondylolisthesis.[74] Most of the findings on advanced imaging are so common in asymptomatic adults that they could be viewed as normal signs of aging.[63] Although MRI is a sensitive diagnostic tool, it is highly nonspecific and reveals abnormalities that are often poorly correlated with symptoms, with disc herniation and/or spinal stenosis found in 20% to 57% of asymptomatic subjects.[63,64,75] Even in acute radiculopathy, early MRI does not provide information that improves treatment decisions or outcomes.[76,77]

Recently published studies indicate that imaging findings frequently precede symptoms, and changes on imaging do not correlate well with the clinical course. One of the few prospective studies found that among patients with documented lumbar imaging findings before the onset of low back pain, 84% had unchanged or even improved findings after symptoms developed.[78] Another prospective study found that presence of disc protrusion on baseline MRI was a negative predictor of subsequent back pain and presence of disc extrusion was not predictive.[79]

3.4.2 Radiation Exposure

Lumbar plain radiography and CT contributes to an individual's cumulative low-level radiation exposure, which could promote carcinogenesis. Lumbar spine CT is associated with an average effective radiation dose of 6 millisieverts (mSv).[80] Based on the 2.2 million lumbar CT scans performed in the United States in 2007, one study projected 1200 additional future cancers.[81]

3.4.3 Labeling

Spine imaging could result in unintended harms from labeling effects, which occur when patients are told that they have a condition of which they were not previously aware.[82] In one acute low back pain trial that performed lumbar spine MRI in all patients, those randomized to routinely receive their results reported smaller improvements in self-rated general health than those who were blinded to the results.[76] In another trial, patients with subacute or chronic back pain who underwent routine radiography reported more pain and worse overall health status after 3 months and were more likely to seek follow-up care than those who did not undergo radiography.[83] Knowledge of clinically irrelevant imaging findings might hinder recovery by causing patients to worry more, focus excessively on minor back symptoms, or avoid exercise and other recommended activities because of fears that they could cause more structural damage, a pattern of maladaptive coping referred to as *fear avoidance*.[84] These behaviors are associated with the development of chronic low back pain,[85] can be difficult to change, and may be insidious, affecting patients even when they are not consciously aware of them.

3.4.4 Association Between Imaging and Surgery

The marked increase in spine surgery rates over time may be related in part to the availability of advanced diagnostic imaging techniques.[86,87] Magnetic resonance imaging (MRI) can provide exquisite anatomic detail of spinal structures and can be extremely valuable in making a definitive diagnosis of many spinal disorders.[88] However, the association between anatomic irregularities in the lumbar spine found by MRI, clinical diagnoses, and outcomes are controversial.[86,89] With improving resolution of MRI,

increasingly smaller irregularities can be detected, and incidental or unrelated findings may trigger further diagnostic studies or treatments.[86,90]

A recent study of claimants with acute, disabling, work-related LBP suggested iatrogenic effects of early (defined as in the first month) MRI, including worse disability, increased medical costs, and increased risk for surgery that were unrelated to severity.[61] Despite all of the uncertainties related to the interpretation of imaging tests, patients and clinicians frequently view findings on imaging as targets for surgery or other procedures.[91] In fact, the association between rates of advanced spine imaging and rates of spine surgery is strong.[90] One study showed that variation in rates of spine MRI use accounted for 22% of the variability in overall spine surgery rates in Medicare beneficiaries, or more than double the variability accounted for by differences in patient characteristics.[69] In one study, patients randomized to rapid MRI had twice the number of lumbar operations as those receiving plain radiographs, although small numbers made the difference only marginally statistically significant.[92] Another study found that for work-related acute LBP, MRI within the first month was associated with a more than eightfold increase in risk for surgery and more than a fivefold increase in subsequent total medical costs compared with propensity-matched controls who did not undergo early MRI.[61]

3.4.5 Indication of MRI

Evidenced-based clinical practice guidelines for acute low back pain (LBP) recommend that magnetic resonance imaging (MRI) may be indicated in the presence of "red flags" (including infection, cancer, and cauda equina syndrome), but that imaging

not be done for patients with nonspecific LBP.[67] Additionally, the guidelines recommend delaying imaging in patients with a suspected herniated disc or spinal stenosis (ie, based on consistent signs and symptoms) to allow for the natural history of improvement that occurs during the first month in up to 50% of disc herniation and radiculopathy cases.[93] Then, MRI may be indicated, after a month of conservative management in these cases, to provide anatomic definition if surgery or epidural steroid injections are being considered.

3.4.6 Recommendations on Imaging Use When to Image

Routine imaging in low-risk patients does not improve patient outcomes but increases costs and exposes patients to harms, including unnecessary radiation exposure and invasive treatments, and the deleterious effect of likely labeling that person as a patient with a degenerative spinal disorder. Several professional societies have issued practice guidelines and standards to help address overuse of low back imaging. In 2007, the American College of Physicians (ACP) and the American Pain Society (APS) published a joint clinical practice guideline on diagnosis and treatment of low back pain.[67] The key recommendations regarding diagnostic imaging were:

- Do not routinely obtain imaging or other diagnostic tests in patients with nonspecific low-back pain
- Perform diagnostic imaging and testing when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected
- Evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis who are candidates for surgery or epidural steroid

injection.

In 2009, the American College of Radiology published consensus-based criteria on appropriateness of imaging for various low back pain scenarios that were largely consistent with the ACP/APS guidelines.[94] For uncomplicated low back pain with or without radiculopathy, imaging was deemed inappropriate in the absence of the following red flags:

- Recent significant trauma or milder trauma at age older than 50 years
- Unexplained weight loss, unexplained fever, immunosuppression, and history of cancer
- Intravenous drug use
- Prolonged use of corticosteroids or osteoporosis
- Age older than 70 years
- Focal neurologic deficit with progressive or disabling symptoms
- Duration longer than 6 weeks.

3.4.7 Patient Education for Unnecessary Imaging

Patient expectations regarding back imaging are frequently discordant with the evidence.[95] However, most patients do not want tests that are unnecessary, costly, or potentially harmful. The ACP guidelines recommend education to help bring patient expectations more in line with the evidence.[96] Explaining that risk factor assessment is sensitive for identifying worrisome conditions such as cancer or infection, acute low back pain is highly likely to improve in the first 4 weeks, and imaging can be performed later

if symptoms fail to improve may help reassure some patients that they have been appropriately assessed and that the problem is not being simply dismissed. In fact, effective education may be less burdensome than often assumed. One randomized trial found that a brief educational intervention regarding back imaging took less than 5 minutes and resulted in similar patient satisfaction with overall care (and similar clinical outcomes) compared with routinely performing lumbar spine plain radiography.[97] Supplementing face-to-face information with patient handouts, self-care education books,[30] online materials,[96] or other methods could be an efficient strategy to reinforce or expand on key educational points.

3.5 Video Educational Intervention

Health information can be delivered through a number of educational media, such as written pamphlets, videos, face-to-face counseling, and web-based applications.[98-100] The use of video as an educational medium offers several potential advantages. First, video interventions can be a less resource-intensive means of delivering educational content. Second, video interventions remove inconsistencies across educators and balance the presentation of information to provide more standardized education.[101] Third, individuals with low health literacy are especially receptive to video-based education.[102] Finally, video-based education can be administered in many forms, such as videotape, digital video/versatile disc (DVD), downloadable media files, and streaming videos from certain Internet websites. In particular, educational videos delivered through video-sharing websites can quickly reach a broad audience via social media.[103-107]

There are several compelling reasons to measure the effectiveness of physician-

patient communication, especially in the management of the chronic disease. Research evidence suggests that patients want a more active role in their medical care [108,109] and specifically want more information from the their physicians.[110] Face-to-face counseling offers tailored education, which allows the educator to review and emphasize information according to the unique needs of the patient.[111] Effective physician–patient communication is essential to achieving important healthcare outcomes such as patients' satisfaction, adherence to physicians' treatment and prevention recommendations, and health-related quality of life.[112,113]

Video media has been shown in several randomized trials to enhance understanding and retention of health information compared to written or in-person instruction only.[114-116] In previous studies, video presentations have been shown to increase health-related knowledge among diverse patient groups.[101,117] In addition, this method can potentially save a significant amount of health care provider time that would otherwise be devoted to education.[101,118] Another benefit of a video education program is that patients are assured of receiving consistent and complete information, minimizing individual clinicians' biases.[101,119]

Video triggers can be used effectively to (1) gain the learners' attention, (2) provide a visual lesson or reinforcement of a concept, and (3) evoke an emotional response. ''Messages also become stickier when they come in the form of a story that elicits emotion in readers or listeners.[120] The value of video education is that it can be available to patients in their chosen language, and can be repeated endlessly in a standardized manner for however many patients require the information. It provides consistent delivery of instruction and a favorable learning environment.[121]

Video is a powerful teaching and learning tool because it is one of the few mediums that has been used effectively in many facets of medical education face-to-face teaching and at a distance. A search of PubMed using the phrase ‘‘use of video in medical education’’ resulted in articles dating back to the 1960s about topics such as knowledge transfer, diagnostic skill development, and clinical skill development.[122] Video can

- Present more information in a given amount of space and time
- Simplify complex concepts
- Clarify pieces of abstract language-based concepts
- Demonstrate concepts/subjects that are in motion and/or relate to one another
- Be more efficient and effective at getting audience attention.

Research shows that the incorporation of images into the educational process increases learning retention.[123]

A study of teaching methods by Dwyer[124] demonstrated that telling alone, showing visually alone, and combined telling and showing all resulted in at least 70% recall at 3 hours. However, 3 days later, retention was 10% for telling alone and 20% for showing alone, versus 65% for combined telling and showing.

Summarizing this chapter, we found most research revealed that education is one of the essential treatment options in healthcare, most importantly in cases such as lower back pain, and we found how important it is to educate patients to manage their problem. Staying active and avoiding unnecessary imaging is one of the strategies to help improve back pain. We explained many aspects which have relations with imaging in terms of causes, red flags, cost, radiations, labeling of the diagnosis results, correlation of imaging with surgeries, indications, and the appropriate cases for imaging and some

recommendations. Finally, we showed some studies' effects of the video as educational intervention for low back pain.

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CHAPTER 4

METHODS

4.1 Treatment Groups

Two interventional groups had patients with acute and subacute LBP. We randomized individuals into an outpatient rehabilitation program into fear-avoidance treatment group (n=37) and usual PT group (n=39). Variables of interest were assessed at the baseline, after 6 weeks, and after 3 months. The overall study compared the outcomes of patients with acute/subacute LBP who received usual care PT versus those who received the fear avoidance treatment (education). The usual care intervention might consist of lumbar spinal manipulation, core stretching and strengthening exercises, and/or other standard care for LBP provided at the physical therapists' discretion. The fear avoidance treatment included the usual PT care intervention, education on pain management strategies, and fear avoidance treatment using a video.

4.2 Outcome Measures

Primary aim: compare the effectiveness of usual care PT with added fear avoidance treatment (education) for patients with acute/subacute LBP. In testing our primary aim we tested pain and disability for both usual care of PT and fear avoidance

treatment following acute/subacute low back pain, we expected that acute/subacute LBP patients who received the fear avoidance treatment (education) may have had significantly lower pain and disability scores at 6 weeks and after 3 months compared to individuals who treated with the usual care of PT. We tested pain and disability via the numeric pain rating (NPRS) and the Oswestry disability index (ODI), respectively. The NPRS represents no pain with a 0 and the worst pain imaginable with a 10. The ODI is utilized for assessing functional ability/disability. The value and validity of the NPRS and ODI have been reported.[1,2] We were expecting that early intervention of PT and education may result in greater improvement in pain, and decreased disability in the long term (3 months) compared to those who received standard PT care.

Secondary aim: compare the effectiveness of usual care of PT and the fear avoidance treatment (education) on patient attitudes and beliefs for patients with acute/subacute LBP. For our secondary aim we tested and assessed pain catastrophizing scale (PCS), and the fear avoidance beliefs questionnaire (FABQ) for both usual care of PT and fear avoidance treatment following acute/subacute low back pain to address patients' fear of injury and movement. We expect to find that those individuals with high baseline scores who receive early physical therapy and education may have lower levels of fear and pain catastrophizing at 6-weeks and after 3 months compared to those who receive the usual care of PT only. The first two aims were evaluated at baseline, after 6 weeks, and at 3 months. In testing our secondary aim, we expected to find that those individuals with high baseline pain catastrophizing scale (as measured by PCS), and fear avoidance beliefs questionnaire (FABQ) scores who received PT intervention and fear avoidance treatment may have lower scores at 6 weeks and after 3 months compared to

those who received only the usual PT care.

Third aim: compare the impact of the care in PT clinic and number of visits. Our third aim was testing the patient utilization and visits for both groups to find out whether the fear avoidance treatment has an impact on how many visits the patients had attended during the PT treatment course, and it was evaluated after 6 weeks from the beginning of PT treatment.

4.3 Participants

Males and females who met the eligibility were enrolled. In this project we recruited patients with nonspecific LBP who were scheduled for outpatient physical therapy but had not yet to begin treatment. We recruited patients who had begun to seek care for their condition within a primary care setting in order to examine the feasibility and impact of the fear avoidance intervention occurring early in the care process.

Inclusion criteria: primary reason for PT was LBP, defined as symptoms of pain between the 12th rib and buttocks with or without symptoms extending into the lower extremity(s), which, in the opinion of the examiner, originate from tissues of the lumbar region. Patients who referred to PT by a primary care provider (family practice or internal medicine physician, nurse practitioner or physician assistant) were recruited. Nonspecific LBP diagnosis provided by the referral source (eg, lumbago, low back pain, lumbar strain, backache, etc.). No treatment received in the past year for back pain other than visit to primary care provider. Age 18 - 60 years and the onset of the symptoms less than eight weeks.

Exclusion criteria: patients were excluded if they met any one of the following

exclusion criteria: patients who received treatment for LBP from another healthcare provider other than primary care (eg, chiropractic, massage therapy, injections, etc.) or PT treatment in the past year. Diagnosis provided by the referral source indicating a specific pathoanatomical source for the patient's LBP including fracture, spondylolesthesis, ankylosing spondylitis, radiculopathy, red flags noted in the participant's general medical screening questionnaire (ie, tumor, metabolic diseases etc.).

4.4 Participant Recruitment

The physical therapists in the clinic identified potential eligible patients from referred nonsurgical primary physicians via phone calls by the research assistant, and the primary investigator (PI) sent a recruitment letter to the patients via email. Then the study investigator double checked and called the patient if they responded to confirm the eligibility and set up an appointment for an hour before the PT visit. Detailed written and verbal explanations of the study were provided to the patients in the first visit. The patients were asked if they would like to participate in the study, and if so, they signed an approved consent form then they filled out some questionnaires for pain, disability, fear avoidance, and pain catastrophizing. Lastly, they were randomized to either the fear avoidance treatment or to the usual care of physical therapy using sealed envelopes. If the patient was in the control group or the usual care group then the PI thanked the patient and advised him/her to continue with the physical therapists. Patients were advised to check their emails after 6 weeks and 3 months for the follow up. If the patient was in the fear avoidance treatment group (Education) then the PI showed a video for some instructions and advice for the lower back pain. After watching the video, then the PI

discussed some points in the video and tried to help the patients to manage their lower back problem and prepare them to begin their PT sessions. At the end, the PI thanked the patient and advised them to continue with the physical therapist, and they have advised to check their emails after 6 weeks and 3 months for the follow up.

4.5 Low Back Pain Rehabilitation Treatment Arms: Fear Avoidance Treatment (Education) vs. Usual Care of PT

The fear avoidance treatment group (education group): participants began their treatment program with a single session of fear avoidance education treatment using a video prior to the PT. Then they continued the treatment with licensed physical therapists, which included the usual care of physical therapy: stretching and strengthening exercises of the lower back muscles, manual therapy of the lumbar spine or any modalities that had been used recently in the literature for lower back pain. Each decision and treatment option of the usual care was based on the therapist's decision and the patient case. Thus, all participants in usual care might be engaged to exercises for low back pain (stretching and strengthening exercises), manual therapy techniques to adjust lumbar vertebrae in different levels, pain modalities like electrotherapy or heat and cold therapy. Furthermore, the PI spent half an hour to an hour explaining how we can take care of the injury via video and how the patient might help him/her self to manage their lower back pain problem for one session only with some instructions and advice. The PI also explained how manageable the low back injury is, which addresses the fear that patients have of their injury, advising them to stay active and to avoid unnecessary imaging and surgeries, which might help them overcome the injury and return to their

normal daily activities.

The instructions and advice were displayed to the patients via video and this video designed to help patients to understand the nature of their back pain and how to cope with it. The video was designed from consumer health reports, which were developed in cooperation with American College of Physicians, ACP. The information that is provided, however, applies to anyone with back pain and is the best available information on how we should help patients manage their back pain. The Speakers on the videos are Dr. Deborah Korenstein from the American College of Physicians and Dr. John Santa from consumer reports health ratings center. The video addressed imaging tests like MRI and C.T. scan. According to Dr. Santa, C.T. scans and MRIs may seem like a good idea, but they often merely reveal spinal abnormalities that are not actually contributing to a patient's pain or discomfort, and therefore have a negative impact on a patient's recovery, especially when the problems with these abnormalities can lead to further testing and harmful invasive procedures. People who are quick to get MRI for back pain are 8 times more likely to have surgery but they do not recover any faster. X-ray and CT scans expose people to radiation and increase risk of cancer, but sometimes imaging tests are needed, eg., cancer, signs of severe and worse neurological problems and infection. Some easy strategies can help in about a month, like applying heat to relax the muscles and over-the-counter pain reliever and staying active are recommended from the consumer health reports. Dr. John Santa from consumer reports health ratings center said when the back hurts it can be hard to stay active, but resting in bed for a day or so can make you feel stiff and slow your recovery.

If patient has not had an MRI recently, we explained to them that some studies

have found that the findings from MRI, even though they often do not really mean anything, tend to lead to a greater likelihood of surgery or injections – not necessarily because of the seriousness of your back pain condition, but because of the labels that come from the MRI.

If patient has had an MRI recently, we explained that some studies have found that the findings that may have come from your MRI actually have little impact on your ability to recover. The good news is that you have a lot of control over your recovery through your activity level and attitude. Endpoints will be assessed at the baseline, after 6 weeks, and after 3 months.

The usual care of PT group (control group) included the following: patients received the updated treatment for lower back pain as the same as in the fear avoidance treatment group with licensed physical therapist. Patients in this group assessed by the PI to assess their believes and attitudes regarding the lower back pain, pain and disability. Similar endpoints were assessed at the baseline, after 6 weeks and after 3 months.

4.6 Participant Recruitment and Retention

Figure 2 shows the study flow. Participants were recruited from a primary clinic and PT clinic at the Orthopedic Center within the University of Utah, Redwood Clinic and Greenwood Clinic. The PI did weekly recruitment until the required sample size was obtained. A recruitment letter was sent to the patients via email. Research assistants in each clinic called the patients to make sure they were eligible for the study. If the researcher assistants called the patients and found any possible participant then they contacted the PI via email and provided him the patient's name, email, and phone

number. The other way that PI emailed patients to invite them to participate in the study, if they responded then the PI called the patients to make sure that he or she was eligible to participate in the study. The PI arranged an appointment and usually an hour before the PT appointment. During the first session the PI asked the patient to sign the consent form, filled out some contact information, and to filled out the baseline questionnaire. The follow up was through emails using (REDCap is a secure, web-based application for building and managing online surveys and databases) after six weeks and three months using validated and reliable questionnaires. For retention, all the evaluation and treatment occurred at the Orthopedic Center at the University of Utah, Redwood Clinic, and Greenwood Clinic.

4.7 Randomization and Blinding

Four physical therapists in the department of physical therapy at the University Orthopedic Center, 2 physical therapists from Redwood Clinic, and 1 PT technician from Greenwood Clinic helped in the recruitment process. The research assistants started recruiting patients for this study and tried to find if they were eligible and fit the criteria through the phone calls, and the PI made sure if they were eligible after initial screening from the therapists. If so then they signed a consent form to start the evaluation before patients started their PT treatment. Randomization was created through a computer program. Sequentially numbered and sealed envelopes contained the treatment group assignment for each patient. The PI opened the envelope after signing the consent form and filling out the baseline questionnaire, and we informed the patient in which group they were. The patients in both groups were instructed to follow up with their physical

therapist. Neither patients nor physical therapists were blinded. The PI did the follow up evaluation by sending emails to the consenting participants.

4.8 Outcomes and Tools

Numeric rating scale (NPRS): An NPRS involves asking patients to rate the pain from 0 to 10 (an 11-point scale), 0 to 20 (a 21-point scale), or 0 to 100 (a 101-point scale), with the understanding that 0 represents one end of the pain intensity continuum (ie, no pain) and 10 or 100 represents the other extreme of pain intensity (ie, pain as bad as it could be). The 11-point scale is most frequently used in low back pain studies. The patient is asked to tick a score that best represents the intensity of his or her pain. The construct validity of the NRS has been well documented.[3]

Oswestry Disability Index (ODI) is the most common measure of outcomes of low back pain. This scale evaluates the degree of functional impairment in daily activities that is caused by pain. It comprises 10 sections: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex, social life, and travelling. Each section includes six degrees of limitation in an activity.[4] The score is expressed as a percentage of patient-perceived disability.[5] The Oswestry Disability Index has been recommended in research trials to assess low back pain-related disability.[6]

The Pain Catastrophizing Scale (PCS) is a self-administered questionnaire comprising 13 items that assess the extent of the patient's catastrophizing thoughts and behaviours.[7] There are 3 subscales: helplessness, magnification, and rumination. The total score is computed by summation of all items, and ranges from 0 to 52. Both the original and the English versions [8-38] have been shown to be valid and reliable.

Fear Avoidance Beliefs Questionnaire (FABQ): the FABQ Physical assesses attitudes and beliefs related to general physical activities (4 items, range 0–24) and the FABQ Work assesses attitudes and beliefs related to occupational activities (7 items, range 0–42). Each item is scored from 0, ‘‘do not at all agree,’’ to 6, ‘‘completely agree.’’ For both subscales, a low score indicates low Fear avoidance beliefs, and a score of 14 or more on the FABQ Physical indicates strong Fear avoidance beliefs.[4] This questionnaire has been validated in English.[9]

4.9 Sample Size Calculation

We performed power analysis to estimate the number of participants needed to show the impact of our intervention. We used two main outcomes in our study, (NPRS) and (ODI), to estimate the impact of the intervention, so the power analysis focused on these two primary outcomes. Previous research suggested Minimal Clinically Important Difference (MCID) for pain equals 2[10] and standard deviation (SD) amounts to 2.5 and for ODI equals 6 [11] and SD 18. Based on these statistics, we expect the pain scale should yield a large effect size in our study (Cohen’s d = .80). Power analysis conducted with G*power 3.1.6 [12] indicated that for a two-tailed t test estimating the significance of the difference, we would need 76 participants to obtain a power of .80.

4.10 General Analysis Strategy

The primary aim of the study was to compare the effectiveness of usual care of physical therapy and the fear avoidance treatment for patients with acute and subacute LBP. We investigated the data from these two groups with repeated measures ANOVA to

test for the differences between the two intervention groups (between subjects factor, 2 levels) and investigate whether change in the primary outcomes occurred throughout the study (within subjects factor, 3 levels). We also tested the main effect of the time (time by group interaction) and the pairwise comparison. The primary independent measure was a type of intervention (usual care vs. education) and primary outcomes were as follows: NPRS and ODI Outcomes were measured 3 times throughout the study. Before we perform the planned analyses, we screened the data to make sure that they met the assumptions for the planned statistical analysis.

Our secondary aim was to compare the effectiveness of usual care of physical therapy and the fear avoidance treatment on patient attitudes and beliefs on acute/subacute LBP. Our secondary aims investigated using the same statistical technique as with primary aims with different outcomes as dependent measures. We focused on the following outcomes: the pain catastrophizing scale (PCS) and the fear avoidance beliefs questionnaire FABQ (physical and work subscale).

The third aim was to find out the impact of the process of care in physical therapy and number of visits. Nonparametric t-test using Mann–Whitney U tests for the two interventions groups was used to compare the number of visits as the outcome.

A nonparametric Mann–Whitney U tests were used for the third aim to compare the number of visits between the groups. Data are presented as mean (standard deviation) scores or numbers (percentages), with 95% confidence intervals. Data were analyzed with SPSS version 22.0.

SPSS was used in the analysis of our data. Analyses of primary and secondary outcomes were analyzed according to a randomly assigned treatment. Multiple

imputation (MI) was used for missing values. Fully sequential imputation was used to generate 5 imputed data sets using available primary and secondary outcome scores, treatment group, sex, age, marital status, education, BMI, and Start Back Tool (SBT), to provide distinct evaluations of treatment effects at different follow-up times.

Baseline demographic characteristics were demonstrated between the two groups. We examined the primary and secondary aims with repeated-measures analysis of variance (ANOVA) with treatment group (usual care vs. education) as between-patient variables and time (baseline, 6 weeks, and 3 months) as the within-patient variable. If Mauchly's test of sphericity was significant then that indicated the assumption was violated. To correct for this violation, all within subject effects were reported using the Green-house-Geisser correction. A p value $<.05$ was considered significant for all effects.

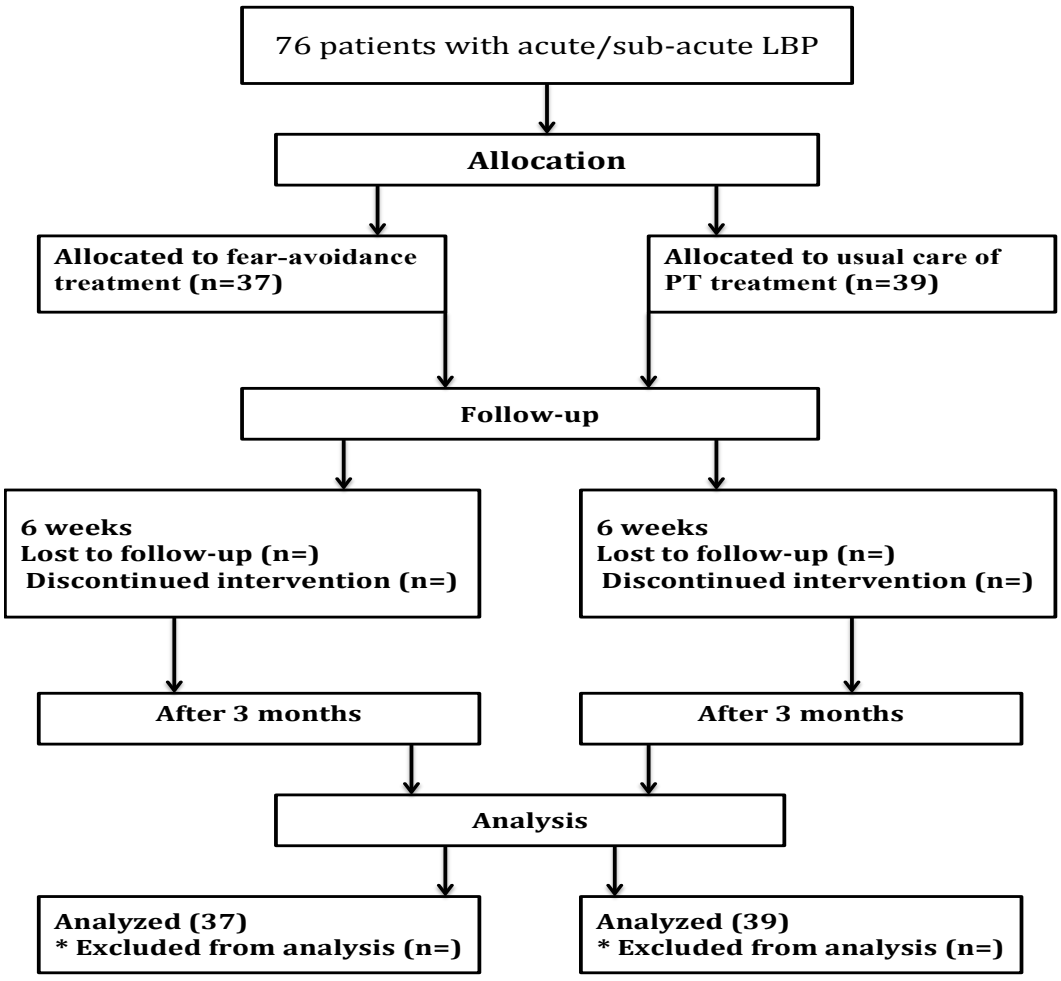

Figure 2 Study Flow Diagram

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CHAPTER 5

RESULTS

A total of 76 individuals who met the selection criteria and consented to participate were randomly assigned between June 2014 to May 2015 to usual care of PT group (39) and education group (37). Nine participants (11.8% of the total participants; 5 from the usual care of PT group and 4 participants from the education treatment group missed the six-week follow-up. Six participants (7.9% of the total participants; 4 participants from the usual care of PT group and 2 participants from the education treatment group dropped out of the study. Figure 3 shows the flow diagram of the participants' recruitment and the follow-up during the study.

Baseline patient characteristics showed the mean age was 39.3 years (SD 11.3), 54 participants (71.1%) were women. Table 1 shows the characteristics of the two groups at baseline. Repeated measure one-way ANOVA was used to compare between the groups for baseline, 6 weeks and 3 months for the primary and secondary outcomes. The within subject test indicated that there was a significant time effect for the pain scores, $F(2, 148) = 14.17$, $p<0.05$, and there was no significant difference for the interaction between time and groups, $F(2, 148) = .10$, $p>0.05$. Similarly, there was a significant difference for the disability index (ODI) across time, $F(1.72, 127.49) = 20.77$, $p<0.05$,

and the interaction of time and groups was not significant, $F(1.73, 127.49) = .09$, $p>0.05$.

Likewise, repeated measures of analysis were used for the secondary outcomes, and they revealed a significant effect for the PCS scores across time, $F(1.66, 122.58) = 13.51$ $p<0.05$, and they did not reveal a significant difference for the interaction of time and groups, $F(1.66, 122.58) = .36$ $p>0.05$. Both physical and work subscale of FABQ showed significant time effect, respectively: $F(1.71, 126.87) = 20.34$ $p<0.05$ and $F(1.67, 123.34) = 6.37$ $p<0.05$. The within subject test of the FABQ physical subscale showed that the interaction of time and group was significant, indicating there was a difference between the groups across time, $F(1.71, 126.87) = 3.55$ $p = .038$, see Figure 4. The graph showed the pattern of change is different between the groups overtime. However, the FABQ work did not show a significant main effect for the interaction of times and groups $F(1.67, 123.32) = .22$ $p>0.05$.

We examined the effects of time and treatment group on primary outcomes (PNRS and ODI) and secondary outcomes (PCS and FABQ; physical and work sub-scale) with a repeated measure ANOVA. Table 2 shows the mean difference and the mean of both groups in baseline, 6 weeks and 3 months. We found there were no significant mean differences between the groups for the primary and secondary outcomes $p > .05$ at any time point.

We tested the normality for the number of visits in both education and usual care groups using The Kolmogorov-Smirnov test (K-S) and Shapiro-Wilk (S-W), and they were both significant < 0.05, which indicated that the distribution was not normal. Thus, a nonparametric independent test was used to compare the number of visits for both groups. The histogram shows the non-normality of number of visits in both groups, see

Figure 5.

A Mann-Whitney test indicates that the number of visits in the education group was not significantly different than the number of visits in the usual care group, $p = 0.8$. The mean number for visits in the usual physical therapy care group was 4.18 (SD 2.99), and the patients who received education and physical therapy had a mean of 4.08 (SD 2.96).

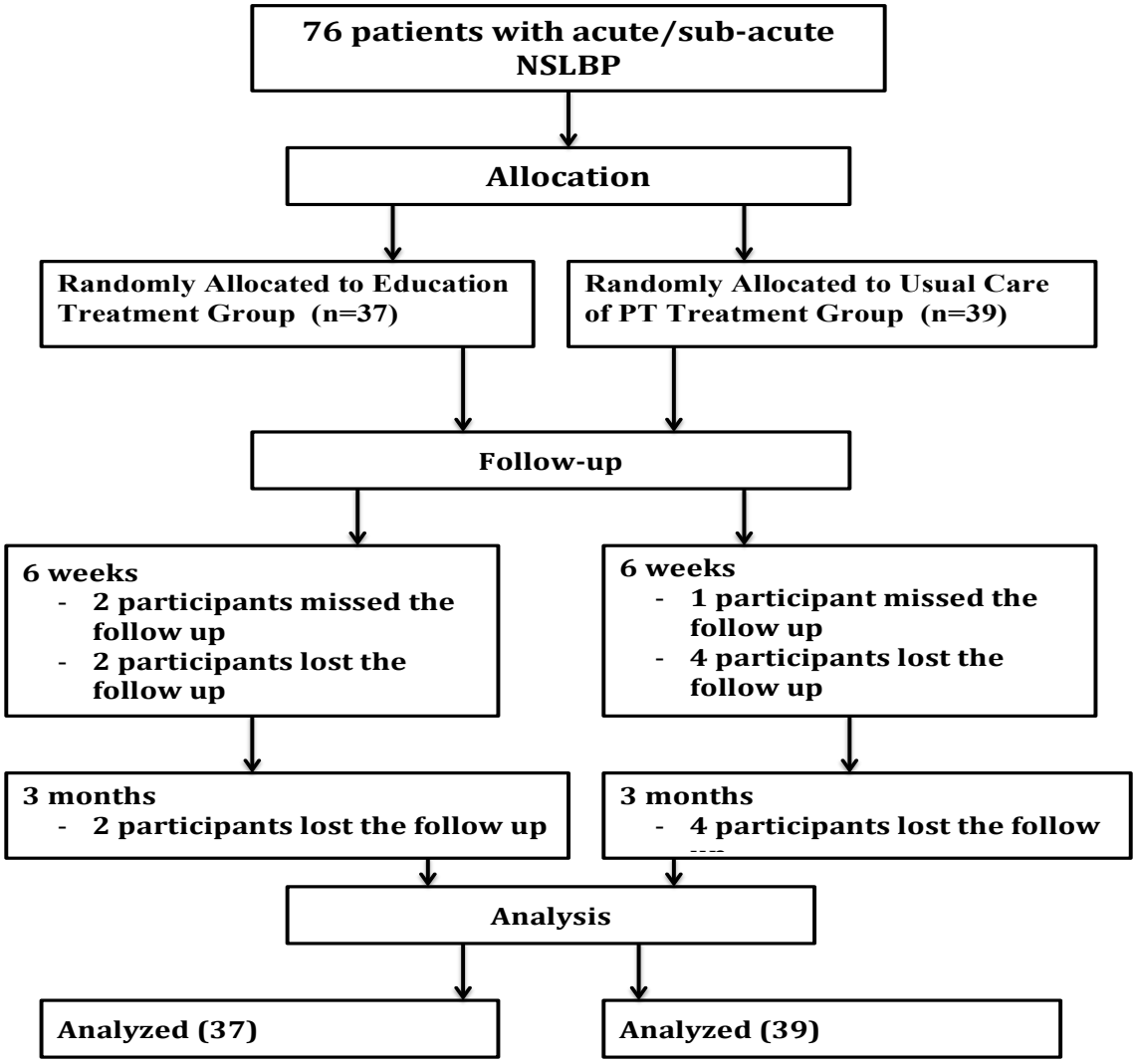

Figure 3 Flow of Patients Through the Study

Table 1. Baseline Participant Characteristics

	Usual Care (n = 39) 51.3%	Education (n = 37) 48.7%
Age (mean (sd) years)	38.51 (11.26)	40.08 (11.42)
Gender (n, %)		
Male	9 (23.1%)	13 (35.1%)
Female	30 (76.9%)	24 (64.9%)
Race (n, %)		
American Indian or Alaskan Native	0 (0%)	1 (2.7%)
Asian	2 (5.3%)	1 (2.7%)
Native Hawaiian or other Pacific Islander	1 (2.6%)	0 (0%)
White or Caucasian	29 (76.3%)	34 (91.9%)
Others	6 (15%)	1 (2.7%)
Ethnicity (n, %)		
Hispanic or Latino	6 (15.4%)	3 (8.6%)
Not Hispanic or Latino	33 (84.6%)	32 (91.4%)
Body Mass Index (mean (sd) lb/in^2)	29.58 (8.81)	29.55 (9.89)
Marital Status (n, %)		
Single, Widowed or Divorced	17 (43.6%)	15 (40.5%)
Married	18 (46.2%)	16 (43.2%)
Live with significant other	4 (10.3%)	6 (16.2%)
Education (n, %)		
Some High School	2 (5.1%)	2 (5.1%)
Completed High School	16 (41.0%)	9 (24.3%)
Completed College Degree	21 (53.8%)	26 (70.3%)
Work status (n, %)		
Not employed outside the home (Homemaker, student, etc)	6 (15.4%)	8 (21.6%)
Employed part-time (< 30 hrs/week)	2 (5.1%)	6 (16.2%)
Employed full-time (30 ≥ hrs/week)	29 (74.4%)	20 (54.1%)
Retired	2 (5.1%)	3 (8.1%)
Impact of LBP on Work Status (n, %)		
Working regular hours	23 (74.2%)	19 (73.1%)
Working reduce hours due to back pain	4 (12.9%)	5 (19.2%)
Working modified duty due to back pain	2 (6.5%)	1 (3.8%)
Unable to work due to back pain	2 (6.5%)	1 (3.8%)

Table 1 Continued.

	Usual Care (n = 39) 51.3%	Education (n = 37) 48.7%
Treatment for current episode of LBP (n, %)		
X-ray	17 (43.6%)	12 (32.4%)
Advanced Imaging	7 (17.9%)	9 (24.3%)
None	20 (51.3%)	20 (54.1%)
Past History of Back Pain (n, %)		
No	19 (48.7%)	9 (24.3%)
Yes	20 (51.3%)	28 (75.7%)

Table 2. Usual Care of Physical Therapy vs. Education. Primary and Secondary Outcomes

Outcome		Usual care	Education		
	Visits	Mean 95% CI	Mean 95% CI	Mean Difference 95% CI	P value
Numeric Pain Rating	Baseline	4.52 (3.85, 5.19)	4.35 (3.66, 5.04)	.17 (-.79, 1.13)	.73
	6 weeks	3.28 (2.53, 4.03)	3.31 (2.54, 4.08)	-.027 (-1.1, 1.05)	.96
	3 months	3.44 (2.62, 5.25)	3.29 (2.45, 4.13)	.15 (-1.02, 1.32)	.80
Oswestry Disability Index	Baseline	31.18 (25.87,36.49)	28.86 (23.42,34.31)	2.32 (-5.39, 9.92)	.55
	6 weeks	24.36 (18.48,30.24)	22.34 (16.30,28.38)	2.02 (-6.41, 10.45)	.63
	3 months	31.42 (27.72,35.11)	29.93 (26.13,33.72)	1.49 (-3.81, 6.79)	.58
FABQ Physical Activity	Baseline	13.95 (12.23,15.67)	14.35 (12.59,16.12)	-.40 (-2.87, 2.06)	.75
	6 weeks	11.89 (10.02,13.76)	9.89 (7.98,11.81)	1.99 (-.68, 4.67)	.14
	3 months	12.15 (10.03,14.28)	9.58 (7.39,11.76)	2.58 (-4.67, 5.62)	.096
FABQ Work	Baseline	16.31 (12.73,19.89)	15.38 (11.70,19.05)	.93 (-4.20, 6.06)	.72
	6 weeks	13.09 (9.58, 16.61)	11.83 (8.22, 15.44)	1.26 (-3.77, 6.30)	.62
	3 months	13.52 (10.05,16.99)	11.19 (7.63, 14.76)	2.33 (-2.65, 7.31)	.35

Pairwise Comparison

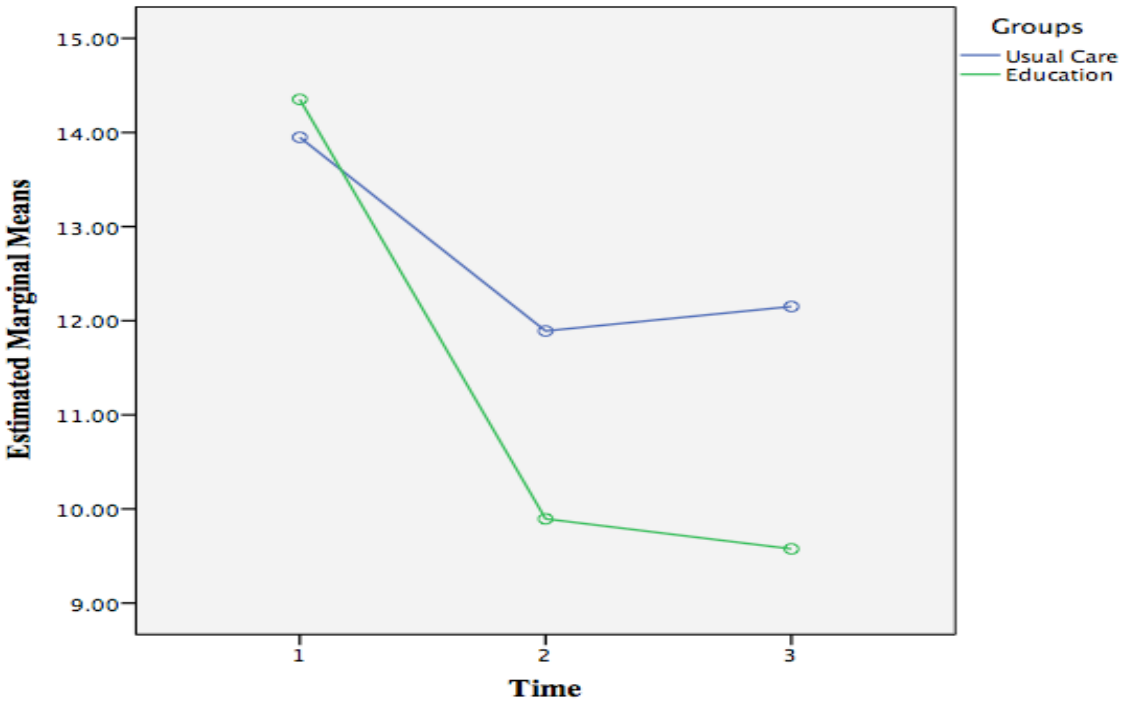

Figure 4 FABQ Physical Sub-scales

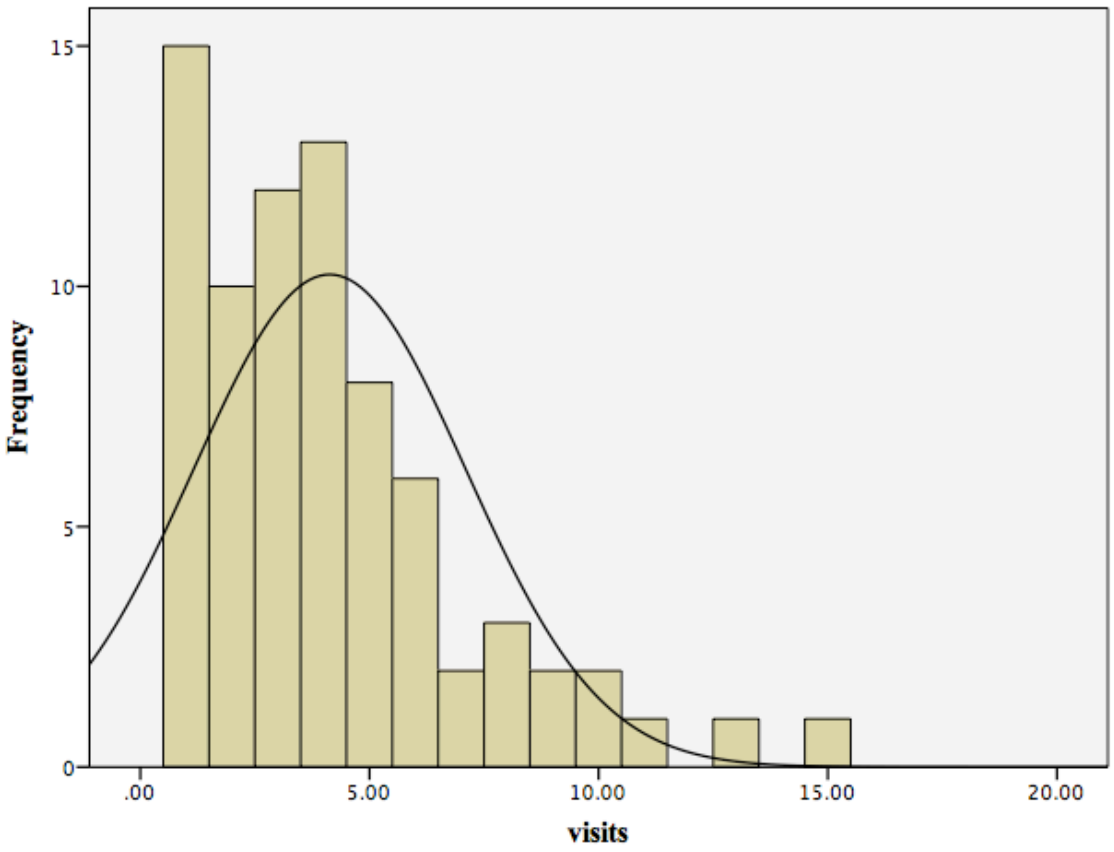

Figure 5 Number of Visits

CHAPTER 6

DISCUSSION

6.1 Summary of Finding

This randomized clinical trial enrolled adults with acute and subacute nonspecific LBP to determine the effectiveness of providing education. The education and usual care groups have been exposed to similar assessment procedures with one exception. The education group was exposed to a 3-minute video and some instructions about how to cope with the injury, to stay active and to avoid unnecessary imaging that the usual care group did not receive. The education was based on the fear-avoidance model to patients who scheduled to begin physical therapy (PT), but before their first session. We hypothesized that patients in the education group would benefit the most from the 3-minute video and education treatment, which incorporated discussion based upon their LBP onset and symptoms. The purpose of the education session was to address patients' fear of pain and movement before PT treatment began. We assumed that this treatment might help prepare patients to be active and ready for the physical treatment and more likely to discuss their LBP onset and symptoms. Our hypothesis was the active education program may have an effect simply because we encouraged LBP patients to increase the level of physical activity in their daily lives. Consequently this may result in

improvements in pain, disability and fear of injury, which may also decrease the number of PT visits. International guidelines recommend educating patients with acute LBP to reduce fear and concern about their LBP, and to promote an active recovery.[1]

This study found that the education intervention could be effective in reducing fear avoidance (physical subscale). The educational intervention was designed to help patients with acute and subacute LBP to cope with their problem and prepare them to begin the physical therapy treatment using video and instructions. We found a significant overall effect of physical subscale FABQ throughout the time, with greater improvement, in the Educational group. This result is consistent with a previous large randomized controlled trial by Moore et al using self care intervention, in which the Self Care intervention showed significantly greater reductions in back-related worry and fear-avoidance beliefs than the control group. However, the education time was longer and the follow-up was up to one year.[2] Another study by Moseley et al [3] indicated that neurophysiology education led to some normalization of attitudes and beliefs about pain, a reduction in catastrophizing, and an improvement in physical performance. A randomized controlled study done by Stroheim et al used intensive group training versus cognitive intervention, and the results showed reduction in both groups in fear-avoidance beliefs about physical activity and work.[4]

We did not find significant differences between the two groups in the other outcomes. The improvement on pain, disability, pain catastrophizing and fear was across time in all primary and secondary outcomes. However, there was no significant improvement to conclude that the education treatment was more effective than the usual care for patients with acute and subacute nonspecific LBP.

There are several possible reasons for our results. It is possible that the education time was not long enough to ensure that patients in the education group understood the most important messages. Patients with acute and sub-acute staged LBP probably need more education about the nature of LBP onset and how to cope with their symptoms. Pervious high-quality evidence showed that individual patient education of greater than 2 hours is more effective than no education or less-intensive education for pain that persists for 4 weeks or more.[5] Moderate quality evidence shows that less-intense individual education and advice to stay active have small benefits and are at least as effective as other back pain interventions.[5,6]

Furthermore, it may not be sufficient to provide only one education session before the PT treatment. Providing additional education sessions may be necessary to make sure that patients are doing well in their treatment and improving on their daily life activities. Thus, it is possible that a longer duration education program may result in improved pain, disability, and fear of injury.

Another possible reason for our results is that the physical therapists might have provided similar instructions and education to patients in both groups once they began treatment, since we did not control the treatment. Because we were hoping that providing a simple education via video may have a positive impact especially on acute and subacute LBP patients. In addition, all therapists were working in clinics associated with an academic institution (The University of Utah), so they may have been more likely to be aware of the need to educate their patients who suffered from LBP.

Another potential justification is that the education was provided by different

therapist. In this study, the primary investigator provided the educational session prior to all patients being transferred to another therapist for treatment. This inconsistency may have affected the delivery of the consistent message or education treatment. Accordingly, not engaging therapists in the treatment and providing both education and PT treatment may have had an effect on our results.

It is possible that this short education session would have been more beneficial for patients with more chronic LBP. A systematic review on patient education program for chronic LBP (such as back schools, brief education, and fear-avoidance training) also recommended a brief education program in clinical settings.[7] The benefits of short education may not be enough to show a significant effect in early stages. Possibly, additional education strategies would be beneficial for patients in early stages of LBP. Educating patients with more in-depth video and written materials could supplement the face-to-face instructions received by the treating physical therapist to potentially improve desired outcomes. A study showed that a short education program (composed of the handing out of the "Back Book" and a consistent 15-minute group talk) on active management, which is feasible in primary care, leads to small but consistent improvements in disability, pain and quality of life.[8]

Lastly, we found that a large majority of patients were not consistent with attending their PT treatment, which may have also impacted the results. Perhaps some patients thought the education and asking them to be active in their daily life activities only without continuing the PT sessions was enough to reduce their symptoms.

6.2 Limitations and Future Research

There were some limitations in our study. First, there was no long-term follow-up in our study, eg, 6 months and 1 year. Secondly, we did not control the treatment provided and we are not certain if the therapists provided education or not. Finally, we recruited subjects from a single health care system and therefore did not have a lot of diversity in our patient sample, which may have an impact on our results.

Future research may engage the therapists in the education treatment and add more visual and handy written material in addition to face-to-face interview and instructions. Increasing the number of education sessions before and during the PT treatment may possibility improve overall outcomes. Targeting some specific type of patients, for instance, patients with acute and subacute who have a high fear level.

6.3 Conclusion

Fear avoidance treatment education did not reveal any significant effects on pain, disability, pain catastrophizing and fear (work sub scale) for both education group and usual care of physical therapy group who had an episode of acute and subacute lower back pain. There was a significant overall effect of physical subscale FABQ throughout the time favoring the educational group.

6.4 References

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